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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/588,127	07/31/2007	Yoav Schechner	P-9034-US	3737

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EXAMINER	
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ART UNIT	PAPER NUMBER
2621	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/588,127	SCHECHNER ET AL.	
	Examiner	Art Unit	
	SHAWN AN	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. As per Applicant's instruction as filed on 10/20/08, claims 1-2, 4-6, 13, 16-17 have been amended, claim 3 has been canceled, and claim 18 has been newly added.

Response to Remarks

2. Applicant's remarks with respect to amended claims 1 and 17 as filed on 10/20/08 have been carefully considered but are moot in view of the following new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-2, 4-7 and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Westhaver (5,719,715) in view of Lai et al (6,470,097 B1).

Regarding claims 1, 14, and 17, Westhaver (5,719,715) discloses a system/method for enhancing underwater imaging affected by image degradation effects, the system comprising:

an imaging device (Fig. 13, 40, camera) adapted to acquire at least one image of an underwater scene using an imaging device;

a processing unit (30) for determining attenuation of parts of the scene as required by the imaging device and determining contribution of veiling lights to the at

least one image, (abs.; Fig. 13; col. 6, lines 15-35; col. 3, lines 57-62; col. 6, lines 65-67; col. 7, lines 1-14; col. 10, lines 18-21) and

reconstructing an image of the underwater scene by compensating image characteristics influenced by the attenuation and the veiling light degradation effects, and compensating underwater degradation effects relating to the optical path between illumination sources and different parts of the scene (col. 6, lines 15-35).

Westhaver does not particularly disclose reconstructing an image using a physics-based mathematical model.

However, Lai et al (6,470,097 B1) teaches total variational image restoration from image sequences comprising restoring an image (Fig. 1) using a physics-based mathematical model in order to solve an image-blur coupled optimization problem (col. 6, lines 1-67, see motion model; col. 2, lines 35-43).

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing a system/method for enhancing underwater imaging affected by image degradation effects as taught by Westhaver to incorporate the well known concept as above as taught by Lai et al so as to reconstruct Westhaver's image using Lai's physics-based mathematical model in order to solve an image-blur (associated with being underwater) coupled optimization problem.

Regarding claim 2, Westhaver discloses one of the image characteristics comprising color (col. 6, lines 15-35). Therefore, it would have been considered obvious to select the color from a group of images characteristics consisting of contrast, color, sharpness, and brightness.

Regarding claim 4, Westhaver discloses compensating degradation effects relating to the the optical path between illumination sources and the scene comprises color-balancing (col. 6, lines 15-35). Furthermore, white-balancing is a conventional processing technique known for improving image quality and making the image more pleasing to the viewer.

Therefore, it would have been considered obvious to perform white-balancing, thereby improving image quality and making the image more pleasing to the viewer.

Regarding claims 5-6, Lai et al teaches an inverse filtering and regularization (abs.; col. 1, lines 19-21). Furthermore, Applicant's background of the invention discloses improvement of underwater visibility by reduction of a backscatter with a polarization technique.

Therefore, it would have been considered obvious for Lai's physics-based mathematical model to comprise an inversion of an image-formation model (including backscatter), thereby improving underwater visibility.

Regarding claim 7, it is considered an obvious design choice for Lai's image-formation model (that is inverted) to be approximated such that the approximation error is not discernible just as long as the end result is desirable.

Regarding claims 11-12 and 15, it is conventionally well known to utilize two video cameras for acquiring at least two images simultaneously to display 3-D (stereoscopic) images.

Therefore, it would have been considered an obvious design choice to utilize at least two video cameras so that the reconstructed image comprises 3-D rendering of the scene.

Regarding claim 13, Westhaver discloses the determined attenuation of parts of the scene being used to reconstruct a distance map of the scene (Fig. 13, P_1).

Regarding claim 16, Westhaver discloses determining the distances of the parts of the scene from the imaging device based on at least one image (Fig. 13, P_2; col. 6, lines 15-35).

5. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Westhaver and Lai et al as applied to claim 1 above, and further in view of Auty et al (5,809,161).

Regarding claims 8-9, Westhaver and Lai et al do not particularly disclose acquiring at least two images in different imaging settings and different resolution.

However, Auty et al teaches an object monitoring system comprising at least two cameras (Fig. 1, 6 and 8) for acquiring at least two images in different imaging settings and different resolution(s) for determining an acquisition time when an image of the

object is to be acquired and acquiring the image at the predetermined time (abs.; col. 4, lines 44-66).

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing a system/method for enhancing underwater imaging affected by image degradation effects as taught by Westhaver to incorporate the well known concept as above as taught by Auty et al so as to acquire at least two images in different imaging settings and different resolution(s) for determining an acquisition time when an image of the object is to be acquired and acquiring the image at the predetermined time as desired.

Regarding claim 10, it is conventionally well known to acquire at least two images of the scene in different polarizing states of the imaging device to be applied in many applications such as polarized eye glasses, 3D stereoscopic displays, and other optical systems.

Therefore, it would have been considered quite obvious to acquire at least two images of the scene in different polarizing states of the imaging device to be applied in many applications such as polarized eye glasses, 3D stereoscopic displays, and other optical systems.

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Westhaver and Lai et al as applied to claim 1 above, and further in view of Feldman et al (6,267,051 B1).

Regarding claim 18, Westhaver and Lai et al do not particularly disclose determining attenuation and the contribution of veiling light to the acquired at least one image being done using image data from the at least one image.

However, Feldman et al teaches system/method for implementing corrections in underwater images comprising determining attenuation to an acquired at least one image being done using image data from the at least one image so as to determine that the image was captured underwater at which time an appropriate correction algorithm is utilized/used for modifying the appropriate color channels to compensate for such capture (col. 6, lines 14-38).

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing a system/method for enhancing underwater imaging affected by image degradation effects as taught by Westhaver to incorporate Feldman et al's teachings as above so as to determine that the image was captured underwater at which time an appropriate correction algorithm is utilized/used for modifying the appropriate color channels to compensate for such capture.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to *Shawn An* whose telephone number is 571-272-7324.

9. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SHAWN AN/
Primary Examiner, Art Unit 2621
1/02/09